8.11 SOILS AND AGRICULTURE

This section presents an evaluation of the potential environmental effects from construction and operation of the proposed Pico Power Project (PPP), natural gas compressor station, natural gas pipeline, and waste water pipeline on soils and agriculture. The PPP will be located near San Francisco Bay in Santa Clara, California. This assessment includes the approximate PPP site as well as the 2.0-mile corridor for the 12-inch natural gas pipeline.

Section 8.11.1 describes the existing environment that the project may affect. Section 8.11.2 identifies potential environmental impacts resulting from construction and operation of the PPP plant. Section 8.11.3 discusses potential cumulative impacts, and Section 8.11.4 describes proposed mitigation measures. Section 8.11.5 addresses laws, ordinances, regulations, and standards (LORS) applicable to soils and agriculture. Section 8.11.6 describes the agencies involved and provides agency contacts, and Section 8.11.7 describes the permits required and a schedule for obtaining such permits. Section 8.11.8 contains a list of references cited.

8.11.1 Affected Environment

The PPP will be located on a 2.86-acre site at 850 Duane Avenue in the City of Santa Clara. The site consists of poorly drained soils formed from alluvial clay derived from periodic flooding by the Guadalupe River and San Tomas Aquinas Creek, located approximately one-half mile east and approximately one mile west of the project area, respectively, which flow north towards San Francisco Bay. However, recent cultural activity has severely disrupted the depositional process of this soil type, specifically in the vicinity of the project area. This land is not designated by the California Department of Conservation as Prime Farmland, Farmland of Statewide Importance, nor Unique Farmland (CDC 1995 and 2001). Land at the gas compressor station, and along the natural gas and waste water discharge pipeline routes is similar to the PPP site in soil type. The project site is publicly owned by the City of Santa Clara and is zoned Public/Quasi-Public.

8.11.1.1 Soil Resources

Identification of soil types and their distribution was accomplished primarily through a review of maps provided by the U.S. Soil Conservation Service (now called the Natural Resources Conservation Service [NRCS]). Figure 8.11-1 is a detailed map of the surficial soils in the project area. The soil map units associated with the PPP facility, construction laydown areas, and natural gas pipeline and waste water pipeline routes are listed in Table 8.11-1. Table 8.11-2 provides a detailed summary of the physical and chemical characteristics of each soil type identified from the project site. This information was obtained from the Soil Survey of Santa Clara Area, California (SCS 1958).

Power Plant Site and Natural Gas Compressor Site

The power plant site and natural gas compressor sites are entirely situated within the Sunnyvale clay soil type series (see Figure 8.11-1). However, the surface conditions at the site consist of about 12-inches of well-graded, imported, sandy gravel, which was placed to minimize the pooling of water (Terratech 1986). This aggregate base layer is underlain by native soil identified as the Sunnyvale clay. Based on soil boring logs, the depth of the Sunnyvale clay layer appears to extend to approximately 4.5 feet below ground surface. The Sunnyvale clay is stiff to very stiff and exhibits a high plasticity and expansion potential, and when this soil layer becomes saturated during periods of sustained heavy rain, it softens as loses much of its support capacity.

Table 8.11-1. Soil mapping unit identified by project component.

Project Component	Soil Mapping Unit
PPP site	Sx – Sunnyvale clay, 0 to 1 percent slopes
Natural gas compressor	Sx – Sunnyvale clay, 0 to 1 percent slopes
Natural gas pipeline and metering station	Pd – Pescadero clay, 0 to 1 percent slopes Sx – Sunnyvale clay, 0 to 1 percent slopes Pc – Pescadero clay (adobe), 0 to 1 percent slopes
Waste water pipeline	Sx – Sunnyvale clay, 0 to 1 percent slopes
Construction Laydown and Worker Parking	Sx – Sunnyvale clay, 0 to 1 percent slopes

Source: USDA Soil Conservation Service 1958.

Natural Gas Pipeline and Metering Station

The proposed natural gas pipeline route crosses several soil series, including the Pescadero, Mocho and Sunnyvale (Figure 8.11-1). These clayey soils are usually deep, poorly drained clays, clay loams, and loams formed on nearly level to sloping (less than 9 percent) ground in low alluvial terraces, tidal flats, flood plains and basin rims. These soils exhibit a high shrink-swell potential (Terratech 1986; Helley et al. 1979). Construction of the gas pipeline will only temporarily affect these soils.

Waste Water Discharge Pipeline

The construction laydown and worker parking areas consist of soils of the Sunnyvale soil series. These soils are the same as those located on the power plant site. There will be little disturbance of these soils for laydown and construction parking.

Construction Laydown and Worker Parking Areas

The construction laydown and worker parking areas consist of soils of the Sunnyvale soil series. These soils are the same as those located on the power plant site. There will be little disturbance of these soils for laydown and construction parking.

8.11.1.2 Agricultural Resources

Local agricultural uses in Santa Clara area, predominately to the southeast and southwest include livestock grazing, and cultivation of pumpkins, squash, and cold weather crops (broccoli, lettuce, and cauliflower). None of these agricultural areas are located near the project or its appurtenant facilities. Livestock grazing occurs mainly in the hilly areas to west and east of the City of Santa Clara. Crop cultivation takes place in a few areas within the city. Existing land use, including agricultural use in the area is discussed in Section 8.6, Land Use. The following section is limited to agricultural use for each project component

Power Plant Site and Natural Gas Compressor Site

As mentioned in Section 8.11.1 (Affected Environment) the project site is zoned Public/Quasi-Public. There are no agricultural crops on or near the PPP power plant site.

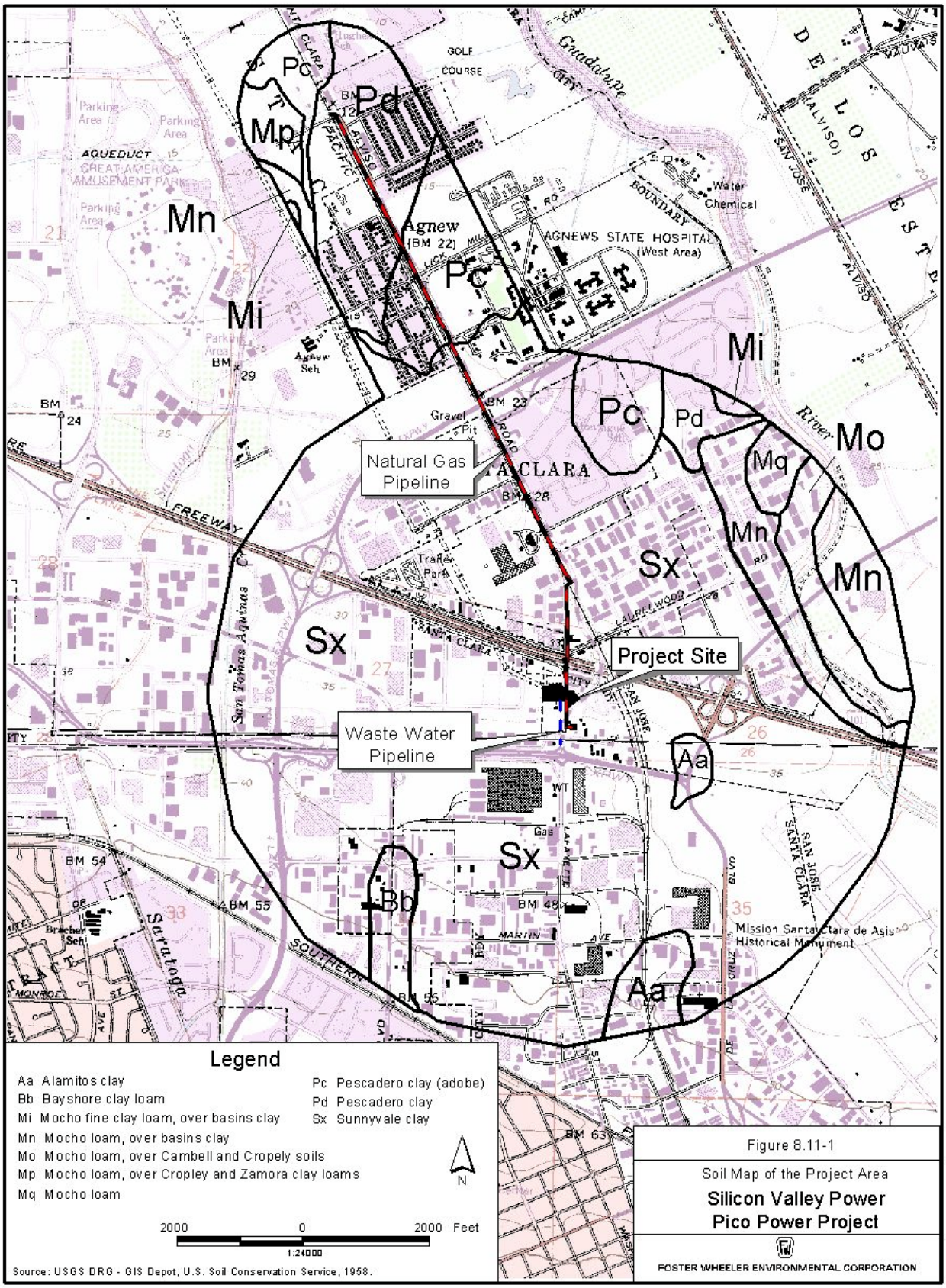
Natural Gas Pipeline
Project Site
Waste Water Pipeline
Mn
Mi
Pc
Pd
Mp
Mo
Mq
Sx
Aa
Bb
Legend
Aa Alamitos clay
Bb Bayshore clay loam
Mi Mocho fine clay loam, over basins clay
Mn Mocho loam, over basins clay
Mo Mocho loam, over Cambell and Cropely soils
Mp Mocho loam, over Cropley and Zamora clay loams
Mq Mocho loam
Pc Pescadero clay (adobe)
Pd Pescadero clay
Sx Sunnyvale clay
N
2000 0 2000 Feet
1:24000
Source: USGS DRG - GIS Depot, U.S. Soil Conservation Service, 1958.
Figure 8.11-1
Soil Map of the Project Area
Silicon Valley Power
Pico Power Project
FOSTER WHEELER ENVIRONMENTAL CORPORATION

Table 8.11-2. Soil mapping unit descriptions.

Map Symbol[1]	Map Unit Name	Depth (inches)	USDA texture	Permeability	Drainage	Erosion Hazard	Land Capability[2]	pH	Salinity
Aa	Alamitos clay (0 to 1 percent slopes)	0-60	Clay	Slow	Poorly drained	None	IIIw-5	7.0-8.0	None
Bb	Bayshore clay loam (1 to 3 percent slopes)	0-60	Clay loam, clay	Moderate to slow	Poorly drained	N/A	IIIw-7	7.5-8.0	Moderate
Mi	Mocho fine clay loam (0 to 1 percent slopes)	0-72	Clay loam, loam	Moderate to slow	Poorly drained	Slight	IIIw-2, IIs-7, IIIs-7, or VIIw-7	7.8-8.3	Slight to strong
Mn	Mocho loam (0 to 1 percent slopes)	0-72	Loam	Moderate to slow	Poorly drained	Slight	IIIw-2, IIs-7, IIIs-7, or VIIw-7	7.8-8.3	Slight to strong
Mo	Mocho loam, over Cambell & Cropely soils (1 to 3 percent slopes)	0-60+	Loam	Moderately rapid to moderately slow	Well drained	Slight	I	7.8-8.0	N/A
Mp	Mocho loam, over Cropley and Zamora clay loams, (3 to 6 percent slopes)	0-60+	Loam, clay loam	Moderate to moderately slow	Well drained	Moderate	IIe-1	7.8-8.0	N/A
Mq	Mocho loam (1 to 3 percent slopes)	0-60+	Loam, fine sandy loam, silt loam	Moderate to moderately slow	Well drained	N/A	I or IIs-7	7.8-8.0	None to slight
Pc	Pescadero clay (adobe) (0 to 1 percent slopes)	0-72	Clay	Slow	Poorly drained	None	IIIw-5 or IIIw-7	7.0-7.8	Slight

Table 8.11-2. (continued.)

Map Symbol[1]	Map Unit Name	Depth (inches)	USDA texture	Permeability	Drainage	Erosion Hazard	Land Capability[2]	pH	Salinity
Pd	Pescadero clay (0 to 1 percent slopes)	0-60	Clay	Slow	Poorly drained	None	IIIw-5, IIIw-7, or IVw-7	7.0-7.8	None to slight
Sx	Sunnyvale clay (0 to 1 percent slopes)	0-72	Clay	Slow	Poorly drained	None	IIIw-5, IIIw-7, or IVw-7, or VIIw-7	7.7-8.3	None to strong

1 Soil numbers refer to numbers shown on Figure 8.11-1 (Soil Map of Project Area).

2 An indication of the suitability of soils for most kinds of field crops. Land capability classes are I through VIII. Subclasses are designated by letters e, w, s, or c. The land capability units are 0 through 9. See Soil Survey of Santa Clara Area, California, p. 153-173.

Source: U.S. Soil Conservation Service 1958.

Natural Gas Pipeline and Metering Station

Construction of the natural gas pipeline will not displace or disrupt agricultural operations, as it will be placed entirely in city streets and on industrial facility property.

Waste Water Discharge Pipeline

Construction of the waste water discharge pipeline will not displace or disrupt agricultural operations, as it will be placed entirely in city streets and on industrial facility property.

Construction Laydown and Worker Parking Areas

There are no agricultural uses near the construction laydown and worker parking areas.

8.11.2 Environmental Consequences

The following subsections describe the probable environmental effects on agricultural production and soils during the construction and operational phases of the project.

8.11.2.1 Soil Resources

The Universal Soil Loss Equation is typically used to quantify water-induced soil loss in agricultural areas. Since there will be no conversion of agricultural land during construction once the northern half of the project site is rezoned, estimates of soil loss have not been determined. Erosion characteristics of individual soil series have been included in Table 8.11-2. The soil series affected by this project have erosion hazards of none to slight (SCS 1958). Anticipated soil erosion during and after construction will be minimized through implementation of the erosion control measures. Routine vehicle traffic during operation of the project will be limited to existing roads, most of which are paved, and standard operational activities will not disrupt soils.

The proposed natural gas and waste water pipeline routes generally follows existing utility corridors or roadways, which will facilitate access and reduce project-related disturbances. Disturbed areas along the pipeline route will be allowed to revegetate following construction activities.

Significance Criteria

The project could cause a significant environmental impact in relation to soil resources by causing:

- Accelerated wind or water-induced soil erosion resulting from project construction or operation
- Increased sedimentation in stream channels and stream crossings

Impacts to soil resources would be significant if construction activities were to occur in areas of high erosion susceptibility and the disturbed areas were left exposed and not properly stabilized.

Construction Impacts

Potential construction effects on soil resources include increased soil erosion, soil compaction, loss of soil productivity, and disturbance of saturated soils. Soil erosion results in the loss of topsoil and increased sedimentation of surface waters downstream of the construction site. The magnitude, extent, and duration of this construction-related impact would depend on several factors, including the proximity of the construction to water; the soils affected; and the method, duration, and time of year of construction.

Power Plant Site and Natural Gas Compressor Site

Construction of the power plant site will require minimal grading and earthwork. Graded areas will be smooth, compact, free from irregular surface changes, and sloped to drain toward the natural drainage system. Any cut-and-fill slopes for permanent embankments will be designed to withstand horizontal

ground accelerations for Seismic Zone 4. Geogrid reinforcement for fill slopes and soil nailing for cut slopes will be provided, if necessary, for slopes requiring soil reinforcement to resist seismic loading. Slopes for embankments will be no steeper than 2:1 (horizontal:vertical).

Any areas to be backfilled (if needed) will be prepared by removing unsuitable material and rocks. The bottom of an excavation will be examined for loose or soft areas. Such areas will be fully excavated and backfilled with compacted fill in layers of uniform, specified thickness. Structural fill supporting foundations, roads, parking areas, etc., will be compacted in accordance with ASTM standards. Final grading will include aggregate surfacing of the entire site to control erosion except for paved roadways or landscaped areas.

The surficial soils at the PPP site are predominantly clay (Sunnyvale clay). The cut-and-fill operations at the site will result in alteration of the existing soil profiles. Alteration of the existing soil profiles, including mixing of soils and rock, will alter the physical, chemical, and biological characteristics of the native soils. Clearing of the protective vegetative cover and the subsequent soil disturbance will likely result in short-term increases in water and wind erosion rates. The proposed project design will include measures to stabilize fill areas and cut slopes and to control drainage and erosion. These design measures are expected to minimize erosion and sedimentation to acceptable levels.

Following construction, wind and water erosion on the plant site will be reduced, because the site will be leveled, compacted, covered with concrete and/or aggregate, and drainage will be controlled through a storm drain system. Implementation of the mitigation measures discussed in Section 8.11.4 will limit impacts to the soil resources at the power plant site to acceptable levels. There will likewise be no significant impacts from air emissions to the surrounding soil-vegetation system.

Construction techniques and soil erosion control measures at the natural gas compressor site will be the same as at the power plant site, except that preparation of the foundations for these smaller structures will take place on a smaller scale.

Natural Gas Pipeline and Metering Station

The construction right-of-way disturbances along the 2.0-mile natural gas pipeline route are expected to be approximately 3 feet wide. Effects on soils and prospects for soil erosion are very slight because the pipeline will be constructed only along improved areas, including paved city streets and parking lots.

Waste Water Discharge Pipeline

The construction right-of-way disturbances for the waste water discharge pipeline will be nearly the same as for the natural gas pipeline. Because the pipeline will be placed entirely in Lafayette Street and the power plant site (former Pico Way), effects on soils and prospects for soil erosion will be minimal.

Construction Laydown and Worker Parking Areas

Large power plant components will be stored at the construction laydown and worker parking areas. These areas (Kifer Receiving Station, Scott Receiving Station, City maintenance yard, and Brokaw Substation) are currently all paved or graveled. No significant erosional impacts will result.

Operational Impacts

Operation of the PPP and natural gas pipeline are not expected to result in significant impacts to soil from either erosion or compaction. Routine vehicular access to the individual project components during operation of the project will be limited to existing roads, most of which are paved. Standard operational activities will not involve disruption of soil.

Power Plant Site

Operation of the project will have little or no effect on soils.

Natural Gas Compressor Station

Operation of the gas compressor station will have little or no effect on soils.

Natural Gas Pipeline and Metering Station

Operation of the natural gas line will have little or no effect on soils; the natural gas line will be underground.

Construction Laydown and Worker Parking Areas

The construction laydown and worker parking areas will be returned to their pre-project uses after construction is completed.

8.11.2.2 Agricultural Resources

The following significance criteria were used in evaluating potential impacts to agricultural resources:

- Substantial displacement or curtailment of agricultural land uses
- Degradation of agricultural land productivity
- Impacts to Prime Farmland, agricultural areas of statewide importance, or unique farmland

Impacts could be significant if the project were to alter land with special designations (e.g., Prime Farmland) to the point that the disturbed area would no longer exhibit the inherent characteristics of the special designation.

Construction Impacts

Since the project will not displace or curtail any agricultural land use, or degrade agricultural productivity, construction of the project will not cause a significant impact to agricultural resources.

Operational Impacts

Operation of the power plant its appurtenant facilities will not cause a significant impact to agricultural resources.

8.11.3 Cumulative Impacts

Since the construction and operation of the project and its appurtenant facilities will not have other than minor and temporary effects on soil resources and will have no effects on agricultural lands, they will cause no cumulative impacts.

8.11.4 Proposed Mitigation Measures

This section discusses mitigation measures that will be implemented to reduce project-related effects on soil resources. The project will not affect any agricultural lands or resources.

Appropriate erosion control measures will help maintain soil resources and water quality, protect property from erosion damage, and prevent accelerated soil loss (which destroys soil productivity and its capacity to support and maintain vegetation). Temporary erosion control measures will be installed before construction begins and will be removed from the construction site after construction activities are completed.

The following mitigation measures can be implemented to reduce potentially significant soil impacts. An acceptable level of soil erosion, as used herein, is defined as that amount of soil loss that would not affect (i.e., limit) the potential long-term beneficial uses of the soil as a growth medium or adversely affect water resources due to accelerated erosion and subsequent sedimentation. The Applicant will:

- Prepare an Erosion Control Plan prior to construction and implement the plan during and following construction. Erosion and sediment control measures may include, but are not limited to, use of sand bags, mulches, protective coverings (e.g., jute netting and rip-rap), installation of culverts under roadways at drainage crossings, installation of sediment detention basins, construction of water diversions along roads, and water bars along pipeline rights-of-way.
- Conduct grading operations in compliance with the Santa Clara City Grading Ordinance.
- Perform construction activities in accordance with the Storm Water Pollution Prevention Plan (SWPPP) and associated Monitoring Program. These items will be required for the project in accordance with California's General Permit for Storm Water Discharges Associated with Construction Sites under the United States Environmental Protection Agency (USEPA) National Pollutant Discharge Elimination System (NPDES) Program. The SWPPP will include erosion control measures, including Best Management Practices to reduce erosion and sedimentation.
- Stabilize disturbed areas that will not be covered with surface structures (e.g., buildings) or pavement following grading and/or cut-and-fill operations. In areas to be disturbed or excavated along pipeline routes and where vegetation is present prior to construction, topsoil will be selectively salvaged and replaced. No seeding or irrigation is proposed.
- Limit soil erosion/dust generation by wetting active construction areas with water (including roads).
- Conduct visual monitoring during and after construction of areas that were disturbed during the construction phase, particularly noting steep slope areas or other erosion prone areas.
- Implement corrective measures in areas that do not respond adequately to initial stabilization techniques or in areas where accelerated erosion is occurring.

8.11.5 Applicable Laws, Ordinances, Regulations, and Standards

Design, construction and operation of the PPP, including the natural gas pipeline will be conducted in accordance with all laws, ordinances, regulations, and standards (LORS) pertinent to Agriculture and Soils.

LORS applicable to Agriculture and Soils are discussed in Table 8.11-3.

Table 8.11-3. LORS Applicable to agriculture and soils

LORS	Applicability	Conformance (Section)
Federal:		
Clean Water Act	Controls erosion of soil and disruption or displacement of surface soil	Section 8.11.4
California:		
Clean Water Act	The Regional Water Quality Control Board implements (California is a National Pollution Discharge Elimination System (NPDES) "approved" state.	8.11.4
Porter-Cologne Act	Discharges to "waters of the state"	Not directly applicable to PPP
Santa Clara County:		
None directly applicable	N/A	N/A
City of Santa Clara:		
Grading ordinance	N/A	N/A

8.11.5.1 Federal

The Clean Water Act (CWA) authorizes the USEPA to regulate discharges of waste water and storm water into surface waters by using NPDES permits and pretreatment standards. These permits are implemented at the state level by the State Water Resources Control Board (SWRCB), but the USEPA may retain jurisdiction at its discretion. The primary interest of the CWA in the current project concerns soil erosion control during construction, and the need to prepare and execute site-specific erosion control measures for construction of each element of the project that will entail physical disruption or displacement of surface soil.

8.11.5.2 State

The State of California Porter-Cologne Act ("California Clean Water Act") is applicable to agriculture and soils. This law regulates discharges to waters of the state. The Porter-Cologne Act is not directly applicable to the PPP, however, because the project will not discharge directly to waters of the state. In addition, the SWRCB, which controls surface water discharge, may become involved indirectly through a discharge National Pollution Discharge Elimination System permit if a surface discharge during construction were to cause soil erosion (see Section 8.15, Water Resources).

8.11.5.3 Local

Ordinances for land grading and storm water pollution control have been established by Santa Clara County (Santa Clara County Ordinance No. NS1203.35 and NS517.55). These ordinances establish permitting requirements and exemptions for grading land and activities that can cause the discharge of pollutants into storm water systems or watercourses.

8.11.6 Involved Agencies and Agency Contacts

There are a number of agencies involved with agriculture, land use, and soil erosion. The NRCS, Santa Clara County Department of Agriculture/Weights and Measures, and the City of Santa Clara Planning

Department will be involved on the PPP project. The agencies and persons to contact for each of these agencies are shown in Table 8.11-4.

Table 8.11-4. Agency contacts.

Topic	Agency	Contact	Title	Telephone
Soil erosion	NRCS 430 G Street #4164 Davis, CA 95616-4164	Eric N. Vinson	State Soil Scientist	(530) 792-5640
Agriculture	Santa Clara County Dept. of Agriculture/Weights and Measures 1553 Berger Drive, Building 1 San Jose, CA 95112	Greg Van Wassenhove	Agriculture Commissioner	(408) 918-4600
Land use	City of Santa Clara Planning Dept. 1500 Warburton Ave. Santa Clara, CA 95050	Art Henriques	City Planner	(408) 615-2450

8.11.7 Permits Required and Schedule

The City of Santa Clara will require a grading and erosion control permit prior to the start of construction. The State Water Resources Control Board will require a NPDES General Permit for Storm Water Discharges prior to the start of construction. The schedule for acquiring these permits is summarized in Table 8.11-5. Information required to obtain each permit is also included.

Table 8.11-5. Permits required and schedule.

Permit/Approval Required	Schedule
Grading/Drainage/Erosion Control Permit: • Engineered Grading Plan • Topographic Plan • Drainage controls • Surface Hydrology Report • Geotechnical/Geological Hazard Evaluation • Identify material source or disposal location and haul route • Erosion and Dust Control Plan • Traffic Control Plan	30 days prior to start of construction activities, or as agreed with the CEC CPM.
NPDES General Permit for Storm Water Discharges Associated with Construction Activities: • Submit Notice of Intent (NOI), including facility information, receiving water information, implementation requirements, site map, and certification • Prepare a Storm Water Pollution Prevention Plan (SWPPP) • Prepare a Storm Water Monitoring Plan (SMP)	Submit application 120 days prior to start of construction, or as agreed with the CEC CPM.

8.11.8 References

California Department of Conservation. 1995. Soil candidate listing for Prime Farmland and farmland of Statewide Importance, Santa Clara County.

——2001. Santa Clara County Important Farmland map. 1:100,000-scale map.

E. J. Helley, K. R. Lajoie, W.E. Spangle, and M.L. Blair. 1979. Flatland deposits—their geology and engineering properties and their importance to comprehensive planning. USGS Professional Paper 943 (PP 943).

Terratech. 1986. Geotechnical Investigation Lafayette Street Substation, Santa Clara, California. July, 1986.

U.S. Department of Agriculture, Soil Conservation Service. 1958. *Soil survey of Santa Clara Area, California.*